REMARKS

This is a Response to the Final Office Action mailed May 8, 2009 (hereinafter "Office Action"), in which a three (3) month Shortened Statutory Period for Response has been set, due to expire August 8, 2009. Claims 1-3, 8, 9, 11, 19 and 26 are currently amended. Claims 7, 18, 20 and 24 have been previously canceled without prejudice. No new matter has been added to the application. The Director is authorized to charge any additional fees due by way of this Amendment, or credit any overpayment, to our Deposit Account No. 19-1090. Claims 1-6, 8-17, 19, 21-23, and 25-35 are pending.

Summary of Claimed Subject Matter

Isolated electrical or "island" networks are used to supply power to areas that are not connected to a central power supply network but in which renewable energy sources, such as wind, sun, and/or water power, and the like, are available. For example, an island in the ocean, off-shore arctic areas, isolated mountain regions, deserts, or other locations that are isolated from public power supplies may be serviced by isolated electrical networks. The present invention is directed towards sensing changes in power demands in such isolated electrical networks, and methods for controlling the production of power from a variety of different sources, some more environmentally friendly than others.

One key issue is where in the network to sense for changes in power demand. Should the power demand sensing be done at each alternating current load device? At each power generation device?

The present invention solves this problem by sensing the power demand changes on the direct current bus bar 28 and controls all generation of power, whether ac or dc power generation, based on the direct current sensor device 29 on the direct current bus bar 28. More particularly, as shown in Figure 3 of the application (reproduced below), the present invention is directed to an isolated electrical network wherein a direct current device 29 is connected to a direct current bus bar 28 that terminates at inverter 24 to detect a power required in an alternating current network located on the output side of the inverter 24. As a result of this sensing by the direct current device 29 on the direct current bus bar 28, the present invention is particularly

adapted to recognize a demand for power or an excess supply of power and compensate accordingly before fluctuations in the network power frequency appear – a feat in direct contrast to prior art network testing methods that detect power frequency in an alternating current network to determine whether available power corresponds to required power. *See* **5:28-6:7**. [1]

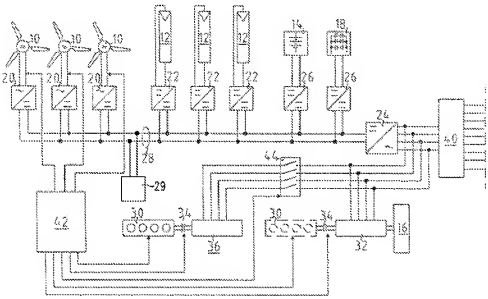

FIG. 3

In operation, the direct current device 29 detects via the direct current bus bar 28 changes in the demand for power in the alternating current network and enables a controller 42 (*see* **10:1-3**) to prioritize the generation of available power from various networked power sources to satisfy the detected demand. As shown, these network power sources include not only direct current power generators 10 and 12 and intermediate storage devices 14 and 18 connected to the direct current bus bar 28, but also alternating current power generators 32 and 36 and intermediate storage devices 16 connected to the ac network on the output side of inverter 24.

More specifically, when the required power level sensed by the direct current device 29 is less than the available power from one or more wind turbines 10 (each having a first power generator), the wind turbines 10 are directed by the controller 42 to provide the required power. The wind turbines 10 being controllable, such as, for example, by varying a blade angle

[1] For brevity, where specific passages of the specification are cited, they will be indicated, in bold text, by a page number separated from a line number by a colon, *e.g.*, 7:27, indicating page 7, line 27.

of the wind turbines, in order to permit changes in generated power to correspond to fluctuating loads on the alternating current network. Put another way, when certain loads on the alternating current network are turned off and energy demands fall, the wind turbines 10 are controlled to generate less energy. *See, e.g.*, **7:17-20**. Conversely, when loads are turned on and energy demands rise, the wind turbines 10 are controlled to generate more energy (limited of course by the maximum energy output of the wind turbines at a given time). In this manner, the wind turbines 10 are configured to be the primary energy source of the isolated electrical network. *See, e.g.*, **7:27-8:2**. To increase the capacity of the electrical network, the wind turbines 10 may be supplemented with electrical energy produced by other renewable energy sources, such as, for example, the optional photovoltaic elements 12 shown in Figure 3. *See* **8:16-18**.

To equalize fluctuations of the available power from the isolated electrical network and/or respond to an increased power demand spontaneously and, on the other hand, to be able to use available energy, which is not in demand at the moment, at least one intermediate storage device 14, 18 is coupled to the direct current bus bar 28 to store electrical energy and discharge the stored energy quickly on demand. *See* **4:17-21**. As shown in Figure 3, the intermediate storage device may be, for example, an accumulator block 14 or a capacitor block 18 connected via charging/discharging circuits 26. *See* **8:19-9:1**. In addition, an intermediate storage device may also be connected to the alternating current network, such as, for example, an intermediate storage device in the form of a flywheel 16 coupled a second generator 32.

These intermediate storage devices may be charged when the required demand sensed by the direct current device 29 is less than the power available from the wind turbines 10 (and optional photovoltaic elements 12), and conversely, may be discharged when the required demand sensed by the direct current device 29 is greater than the power available from the wind turbines 10 (and optional photovoltaic elements 12). In this manner, the intermediate storage devices collectively form a secondary power source capable of supplementing the primary energy source of the wind turbines in response to detected power demands.

Consequently, it is only when the required power detected by the direct current device 29 exceeds that available from the wind turbines 10 (and optional photovoltaic elements 12) and the intermediate storage devices 14, 16, 18 that an internal combustion engine 30 is

required to drive a second generator 32 to meet such gaps in required power. *See* **7:8-13, 7:21-26**. Accordingly, the time in which the engine 30 must be operated is relatively limited, thus resulting in a particularly environmentally friendly isolated electrical network.

In sum, the unique combination of features of the present invention enables sensing the required power in an alternating current network with a direct current device 29 before fluctuations in the network power frequency appear, thereby enabling the provision of electrical energy to isolated locations in a particularly efficient and reliable manner. The present invention is also particularly environmentally friendly, relying primarily on renewable energy sources (*e.g.*, wind energy) and intermediate storage devices to supply electrical energy while being supplemented only when necessary by energy supplied from one or more internal combustion engines.

Of course, this summary has been provided as a general description of subject matter and does not limit or define the claims or their meaning. The scopes of the respective claims are to be construed by their own terms and not by this summary.

Rejections Under 35 U.S.C. § 103

Claims 1-5, 8-10, 19, 21-23, 26-27, 29, 31 and 34-35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wichert ("PV-Diesel Hybrid Energy Systems for Remote Area Power Generation – A Review of Current Practice and Future Developments") in view of Lundsager ("Main Results from Riso's Wind-Diesel Programme") and Da Ponte (US 6,175,217).

Independent Claim 1 and Dependent Claims Thereof

The invention recited in independent claim 1 is not obvious in view of Wichert, Lundsager and Da Ponte. The Examiner admits that Wichert does not expressly disclose "a direct current device coupled to the direct current bus bar to detect the electrical power required in the alternating current network," as recited in claim 1. *See* Office Action, page 5. Consequently, the Office Action points to Lundsager and Da Ponte for this teaching that is missing from Wichert. More particularly, the Office Action asserts that "Lundsager discloses a plurality of devices for detecting electrical power required at different points in the system (table

3.1, pages 21-22)" and that "[t]hese devices can also be interpreted as a 'dc device' coupled to the dc bus bar." Alternatively, the Office Action asserts that Da Ponte discloses "a dc device (16; col.4, lines 26-45) coupled to the dc bus bar to detect the power required in the ac network." Applicant respectfully disagrees. Neither Lundsager nor Da Ponte teach or suggest "a direct current device coupled to the direct current bus bar to detect the electrical power required in the alternating current network," as recited in claim 1.

With respect to Lundsager, the Office Action merely points to a list of sensors for a wind-diesel test facility from Table 3.1 and asserts that these devices could be interpreted as a "dc device" coupled to the direct current bus bar. However, the Lundsager reference only generally states with regard to the sensors of Table 3.1 that, "[a] total of more than 60 instruments measures powers, currents, voltages, frequencies and other parameters of at various points in the switch board or in the attached facilities." *See* Lundsager, page 19, first paragraph. Although Lundsager arguably discloses sensing means generally, there is no specific teaching with respect to sensing or detecting the electrical power required in the alternating current circuit on a direct current bus bar. In fact, with respect to electrical power demand, Lundsager teaches monitoring grid frequency and all three phase voltages in an alternating current network. *See* Lundsager, bottom of page 16. Accordingly, Lundsager teaches away from sensing or detecting electrical power required in the alternating current network on a direct current bas bar, as it teaches testing methods that detect power frequency in an alternating current network (as is conventional in the power generation industry). Furthermore, in Lundsager, the measuring of direct current values is only disclosed in relation with the battery storage container – these values being the battery voltage, the battery current and the rectifier current. *See* Lundsager, bottom of page 18. These measurements are directed only to the battery storage container; there is no measurement of the required power of the alternating current network on a direct current bus bar. Consequently, Lundsager fails to teach or suggest the aforementioned limitation of claim 1.

With respect to Da Ponte, the alleged direct current device is a measurement and control circuit 16 which utilizes a signal from a voltage sensor 18 to stabilize a voltage of the system. While there may be some interdependence between the sensed voltage and a load on the system, there is no explicit or inherent disclosure of a direct current device coupled to a direct

current bus bar to detect power required in an alternating current network. Consequently, Da Ponte, like Lundsager, fails to teach or suggest "a direct current device coupled to the direct current bus bar to detect the electrical power required in the alternating current network," as recited in claim 1.

Accordingly, for at least this reason, independent claim 1 and all dependent claims thereof are allowable over Wichert, Lundsager and Da Ponte.

Claim 1, as amended, further recites, *inter alia*, "a direct current bus bar to feed the electrical power from the first power generator and the intermediate storage device into an alternating current network, power flow being only unidirectional from the direct current bus bar to the alternating current network" (emphasis added).

The Examiner admits on page 5 of the Office Action that Wichert does not expressly disclose unidirectional flow from the direct current bus bar to the alternating current network as recited in claim 1. To supply this missing teaching of Wichert, the Examiner has cited Lundsager and Da Ponte.

However, even assuming that Lundsager and/or Da Ponte disclose a system with unidirectional flow from a direct current bus bar to an alternating current network, modifying the hybrid energy system of Wichert shown in Figures 1 and 4 by effectively replacing the bi-directional inverter with a unidirectional element would change a basic principle of operation of that system. More specifically, the Wichert system shown in Figures 1 and 4 includes several direct current power sources connected to a direct current bus and an alternating current power source connected to an alternating current bus. A bi-directional inverter allows for supplying the dc and ac loads with ac and dc power respectfully (*i.e.*, the system features bi-directional power flow). *See* Figure 4 of Wichert, reproduced immediately below.

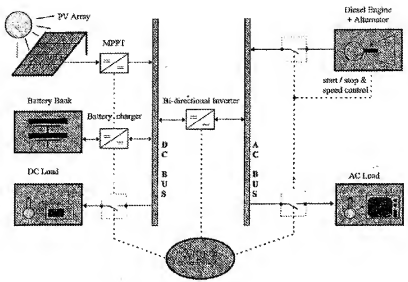

Fig. 4 Parallel PV-diesel hybrid energy system.

Replacing the bi-directional inverter to only allow unidirectional power flow would essentially cut off the ac power source from supplying the dc load, or likewise, cut off the dc power source from supplying the ac load. Accordingly, the proposed modification would result in a basic change in the principle in which that system is shown to operate (*i.e.*, bi-directional power flow wherein ac power sources can supply dc loads and dc power sources can supply ac loads), the proposed modification therefore being insufficient to render claim 1 obvious. *See In re Ratti*, 270 F.2d 810, 813, 123 USPQ 349 (CCPA 1959). Rather, modifying the system of Wichert to, among other things, eliminate the dc loads, replace the bi-directional inverter with a unidirectional element and add a direct current device to detect power required in an alternating current network to arrive at the system of claim 1 is a result of the impermissible use of hindsight using Applicant's disclosure as a blueprint.

Accordingly, for this additional reason, claim 1 and all dependent claims thereof are allowable over Wichert, Lundsager and Da Ponte.

Independent Claim 19 and Dependent Claims Thereof

Although the language and scope of independent claim 19 differs from that of independent claim 1, the allowability of claim 19 will be apparent in view of the above discussions.

For example, claim 19 recites, *inter alia*, "detecting electrical power required in an alternating current network with a direct current device coupled to a direct current bus bar."

As previously explained above, neither Wichert, Lundsager nor Da Ponte teach or suggest a direct current device coupled to a direct current bus bar to detect power required in an alternating current network, and thus, fail to render claim 19 obvious.

As another example, claim 19 recites, *inter alia*, "generating electrical power with at least one first generator electrically coupled to the direct current bus bar and driven by at least one wind-power station the power flow being only unidirectional from the direct current bus bar to the network" (as amended). As previously explained above, modifying the bi-directional power flow system of Wichert with the alleged teaching of Lundsager and/or Da Ponte regarding unidirectional power flow would fundamentally change a basic principle of operation of that system, and therefore, the proposed modification fails to provide a sufficient basis to render claim 19 obvious.

Accordingly, independent claim 19 and all dependent claims thereof are allowable over Wichert, Lundsager and Da Ponte.

Claims 11-14, 16-17, 25, 28, 30 and 32-33 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wichert in view of Lundsager, Da Ponte and De Zeeuw ("On the Components of a Wind Turbine Autonomous Energy System").

Wichert, Lundsager, Da Ponte and De Zeeuw do not teach or suggest the invention recited in claims 11-14, 16-17, 25, 28, 30 and 32-33 which depend from claim 1. In particular, De Zeeuw does not teach or suggest the features of claim 1 that are missing from Wichert, Lundsager and Da Ponte. For example, De Zeeuw does not teach or suggest a direct current device coupled to a direct current bus bar to detect the electrical power required in an alternating current network, as recited in claim 1. Instead the Office Action has cited De Zeeuw only for allegedly teaching elements unrelated to the missing teachings of Wichert, Lundsager and Da Ponte. As such, Wichert, Lundsager, Da Ponte and De Zeeuw fail to teach the invention of claims 11-14, 16-17, 25, 28, 30 and 32-33 which depend from claim 1. Thus, claims 11-14, 16-17, 25, 28, 30 and 32-33 are nonobvious in view of Wichert, Lundsager, Da Ponte and De Zeeuw.

Claims 6 and 31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Wichert in view of Lundsager, Da Ponte and Jaunich (US 6,605,880).

Wichert, Lundsager, Da Ponte and Jaunich do not teach or suggest the invention recited in claims 6 and 31 which depend from claim 1. In particular, Jaunich does not teach or suggest the features of claim 1 that are missing from Wichert, Lundsager and Da Ponte. For example, Jaunich does not teach or suggest a direct current device coupled to a direct current bus bar to detect the electrical power required in an alternating current network, as recited in claim 1. Instead the Office Action has cited Jaunich only for allegedly teaching elements unrelated to the missing teachings of Wichert, Lundsager and Da Ponte. As such, Wichert, Lundsager, Da Ponte and Jaunich fail to teach the invention of claims 6 and 31 which depend from claim 1. Thus, claims 6 and 31 are nonobvious in view of Wichert, Lundsager, Da Ponte and Jaunich.

Claim 15 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Wichert in view of Lundsager, Da Ponte and Offringa (EP 046,530 A1).

Wichert, Lundsager, Da Ponte and Offringa do not teach or suggest the invention recited in claim 15 which depends from claim 1. In particular, Offringa does not teach or suggest the features of claim 1 that are missing from Wichert, Lundsager and Da Ponte. For example, Offringa does not teach or suggest a direct current device coupled to a direct current bus bar to detect the electrical power required in an alternating current network, as recited in claim 1. Instead the Office Action has cited Offringa only for allegedly teaching elements unrelated to the missing teachings of Wichert, Lundsager and Da Ponte. As such, Wichert, Lundsager, Da Ponte and Offringa fail to teach the invention of claim 15 which depends from claim 1. Thus, claim 15 is nonobvious in view of Wichert, Lundsager, Da Ponte and Offringa.

Conclusion

Overall, the cited references do not singly, or in any motivated combination, teach or suggest the claimed features of the embodiments recited in independent claims 1 and 19, and thus such claims are allowable. Because the remaining claims depend from the allowable independent claims, and also because they include additional limitations, such claims are likewise allowable. If the undersigned agent has overlooked a relevant teaching in any of the

references, the Examiner is requested to point out specifically where such teaching may be found.

In light of the above amendments and remarks, Applicant respectfully submits that all pending claims are allowable. Applicant, therefore, respectfully requests that the Examiner reconsider this application and timely allow all pending claims. Examiner Amrany is encouraged to contact Mr. Barrett by telephone to discuss the above and any other distinctions between the claims and the applied references, if desired. If the Examiner notes any informalities in the claims, he is encouraged to contact Mr. Barrett by telephone to expediently correct such informalities.

Respectfully submitted,

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